

What is claimed is:

Claims:

1. A method of underfilling a gap between a component and a component carrier to encapsulate a plurality of electrical connections extending therebetween, one of the component carrier and the component including a passageway that communicates with the gap, the method comprising:
  - 5 heating the component and the component carrier;
  - introducing underfill material into the passageway; and
  - moving underfill material from the passageway into the gap for encapsulating the plurality of electrical connections.

2. The method of claim 1 wherein introducing underfill material further comprises:

filling at least a portion of the passageway with underfill material before significant movement of underfill material into the gap.

3. The method of claim 1 wherein the passageway is located at a geometrical center of the one of the component carrier and the component.

4. The method of claim 1 wherein the passageway is offset from a geometrical center of the one of the component carrier and the component.

5. The method of claim 1 wherein the component and the component carrier are heated before the underfill material is introduced into the passageway, and the method further comprises:

maintaining the component at a substantially constant temperature until the plurality of electrical connections are encapsulated by the encapsulating material.

6. The method of claim 1 wherein heating the component and the component carrier is performed simultaneously with introducing underfill material.

7. The method of claim 1 further comprising:  
increasing a temperature of the component and component carrier to form a fillet about an outer peripheral edge of the component.
8. The method of claim 1 wherein a volumetric capacity of the passageway is less than a volume of underfill material required to underfill the gap.
9. The method of claim 8 further comprising:  
repeating the steps of introducing and moving until the gap is substantially filled with underfill material.
10. The method of claim 8 further comprising:  
placing a flow control barrier about the passageway before the underfill material is introduced into the passageway for increasing the volumetric capacity of the passageway.
11. The method of claim 1 further comprising:  
placing a flow control barrier about the passageway before the underfill material is introduced into the passageway.
12. The method of claim 11 further comprising:  
dispensing the flow control barrier about the passageway.

13. The method of claim 1 wherein introducing the underfill material further comprises:

dispensing the underfill material in a liquid-phase into the passageway.

14. The method of claim 1 wherein introducing the underfill material further comprises:

placing a solid-phase volume of underfill material into the passageway that converts into a liquid phase during heating.

15. The method of claim 1 wherein heating the component and component carrier further comprises:

transferring heat energy directly to the component carrier from a heat source.

16. The method of claim 1 wherein heating the component and component carrier further comprises:

transferring heat energy directly to the component from a heat source.

17. The method of claim 1 further comprising a plurality of passageways, and introducing the underfill material further comprises:

dispensing the underfill material into each of the plurality of passageways.

18. The method of claim 17, wherein the plurality of passageways are symmetrically arranged about a geometrical center of the one of the component and the component carrier.

19. The method of claim 1 wherein the passageway is defined in the component carrier.

20. The method of claim 1 wherein the passageway includes first and second bores that differ in diameter.

21. The method of claim 20 wherein the first bore is defined by a flow control barrier, and further comprising:

placing the flow control barrier about the second bore before the underfill material is introduced into the passageway.

22. The method of claim 1 wherein the passageway is tapered.

23. The method of claim 1 wherein the passageway is inclined relative to a planar surface of the one of the component and the component carrier defined at a boundary with the gap.

24. A method of underfilling a gap between a component and a component carrier to encapsulate a plurality of electrical connections extending therebetween, comprising:

- positioning a dispenser relative to a passageway defined in one of
- 5 the component carrier and the component that communicates with the gap;
- heating the component and the component carrier;
- introducing underfill material into the passageway; and
- moving underfill material from the passageway into the gap for encapsulating the plurality of electrical connections.

25. The method of claim 24 wherein introducing underfill material further comprises:

filling at least a portion of the passageway with underfill material before significant movement of underfill material into the gap.

26. The method of claim 24 wherein the passageway is located at a geometrical center of the one of the component carrier and the component.

27. The method of claim 24 wherein the passageway is offset from a geometrical center of the one of the component carrier and the component.

28. The method of claim 24 wherein the component and the component carrier are heated before the underfill material is introduced into the passageway, and the method further comprises:

5 maintaining the component at a substantially constant temperature until the plurality of electrical connections are encapsulated by the encapsulating material.

29. The method of claim 24 wherein heating the component and the component carrier is performed simultaneously with introducing underfill material.



30. The method of claim 24 further comprising:  
increasing a temperature of the component and component carrier  
to form a fillet about an outer peripheral edge of the component.

31. The method of claim 24 wherein a volumetric capacity of the  
passageway is less than a volume of underfill material required to underfill the  
gap.

32. The method of claim 31 further comprising:  
repeating the steps of introducing and moving until the gap is  
substantially filled with underfill material.

33. The method of claim 31 further comprising:  
placing a flow control barrier about the passageway before the  
underfill material is introduced into the passageway for increasing the  
volumetric capacity of the passageway.

34. The method of claim 24 further comprising:  
placing a flow control barrier about the passageway before the  
underfill material is introduced into the passageway.

35. The method of claim 34 further comprising:  
dispensing the flow control barrier about the passageway.

36. The method of claim 24 wherein introducing the underfill material further comprises:

dispensing the underfill material in a liquid-phase into the passageway.

37. The method of claim 24 wherein introducing the underfill material further comprises:

placing a solid-phase volume of underfill material into the passageway that converts into a liquid phase during heating.

38. The method of claim 24 wherein heating the component and component carrier further comprises:

transferring heat energy directly to the component carrier from a heat source.

39. The method of claim 24 wherein heating the component and component carrier further comprises:

transferring heat energy directly to the component from a heat source.

40. The method of claim 24 further comprising a plurality of passageways, and introducing the underfill material further comprises:  
dispensing the underfill material into each of the plurality of passageways.

41. The method of claim 40, wherein the plurality of passageways are symmetrically arranged about a geometrical center of the one of the component and the component carrier.

42. The method of claim 24 wherein the passageway is defined in the component carrier.

43. The method of claim 24 wherein the passageway includes first and second bores that differ in diameter.

44. The method of claim 43 wherein the first bore is defined by a flow control barrier, and further comprising:

placing the flow control barrier about the second bore before the underfill material is introduced into the passageway.

45. The method of claim 24 wherein the passageway is tapered.

46. The method of claim 24 wherein the passageway is inclined relative to a planar surface of the one of the component and the component carrier defined at a boundary with the gap.

47. The method of claim 24 further comprising:  
attaching the component to the component carrier by forming the plurality of electrical connections.